

LABORATORY RESEARCH: A QUESTION OF WHEN NOT IF(U)  
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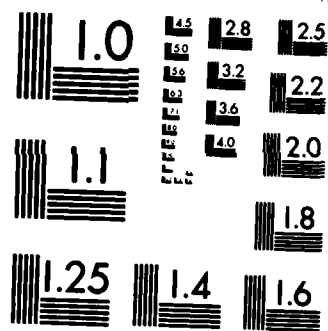
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Laboratory Research:

A Question of When, Not If

by

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Laboratory research is discussed in terms of the contribution of laboratory research to knowledge at any given time. Research is viewed as a process of trade-offs. When viewed from this perspective, it is argued that frequently laboratory research may have high utility for addressing problems relevant in the field. Dimensions or classes of trade-offs are addressed. These are: experimental setting fidelity, replication, constraints, threats to health and safety, research not possible in the field, and feasibility.		



### Laboratory Research: A Question of When, Not If

Actors, behaviors and contexts represent three mutually exclusive and exhaustive categories for all variables in behavioral science research (Runkel & McGrath, 1972). Laboratory research is usually undertaken to gain control over variables in one or more of the three classes--control at a level that typically is not available in research outside the laboratory. Yet, this control is purchased at a price. Laboratory experiments, by their very nature, cannot create designs that truly represent all, or even most, of the conditions present in naturally occurring settings populated by people who exist, interact, and behave in these settings over a long time period (Berkowitz & Donnerstein, 1982). As a result, many behavioral scientists decry the use of any laboratory research and dismiss results obtained from such as irrelevant or, worse yet, misleading for the understanding of naturally occurring human behavior. They seek instead data collected exclusively in natural settings often accepting the validity of such data as blindly as they deny the validity of laboratory data. More than a few organizational psychologists and organizational behaviorists, obligated by the nature of their chosen profession to address problems that have some relevance to human behavior in organizational settings, adamantly hold to the position just described.



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Such an extreme position is neither empirically nor logically justified. This book contains numerous examples of the empirical fallacy of the position. Time and again, results of research conducted in the laboratory were found to generalize to organizational settings. Logically, the position is also weak. It is well accepted that all research, regardless of the setting, requires trade-offs (Runkel & McGrath, 1972). These trade-offs involve the nature of the actors, behaviors and contexts that are selected to be researched and, equally important, the ones that are selected to be ignored. Thus, all settings, whether the laboratory, the field, or some combination of the two, create contextual conditions that have both advantages and disadvantages for contributing to knowledge that generalizes to human behavior in ongoing organizations. For example, the naturalness of the field setting is purchased at the cost of control. Without some control, it is often impossible to disentangle the effects of many different covarying and confounded variables on the behaviors of interest. Is it better to obtain more realism by going to the field yet sacrificing control, or is it better to gain the control in the laboratory but lose some of the naturalness? The obvious answer is that it depends. It depends on the types of trade-offs the researcher needs to make given the nature of the research problem.

Excellent guidance exists for selecting actors, behaviors and contexts in behavioral research (see, for example, Cook & Campbell, 1979; Fromkin & Streufert, 1976; McGrath, Martin, & Kukla, 1982; Runkel & McGrath, 1972). Fromkin and Streufert (1976) focused directly upon laboratory research conducted for



the purpose of understanding human behavior in organizations. The key to their approach was the notion of boundary conditions. These were those conditions likely to influence the extent to which laboratory research generalized to the field. They devoted considerable effort to describing specific variables the presence or absence of which would likely affect the generalizability of laboratory research to field settings.

The remainder of my discussion falls within the purview of a boundary approach to laboratory research. Underlying the discussion is an acceptance of the position that laboratory research can contribute to the understanding of human behavior at work. At the same time, it is also accepted that certain conditions must be met in order to increase the likelihood that laboratory research will be valuable. In contrast to Fromkin and Streufert (1976) who outlined specific variables in the research setting that influence the value of specific laboratory research, the perspective taken here focuses on those conditions that make the laboratory the preferred setting for gathering data on organizationally relevant problems. Although this perspective leads to looking at the problem of when to use laboratory research somewhat differently than has been done by others, it is recognized that a boundary conditions perspective may lead to the same conclusions in many instances. Thus, the present perspective should be seen to compliment Fromkin and Streufert rather than as an opposing position.

Four general sets of conditions for using laboratory research are discussed. These conditions exist when (1) high fidelity between the laboratory and the field can be established.



(2) laboratory conditions are to be recreated in the field, (3) field conditions limit the feasibility of field research, and (4) the hypothesis of interest is one demanding simply the demonstration of an effect rather than direct generalization of that effect to a particular setting.

### High Fidelity

It is a well accepted belief that the generalization of laboratory findings to field settings is greatest when there is a high degree of similarity between the laboratory and the field. In this case, research is analogous to training where transfer is greatest when both the stimulus conditions and the behavioral responses are similar in the training setting and on the job to which the training is to transfer (Blum & Naylor, 1968). For high positive transfer-of-training, the actors should be identical in both conditions, the settings extremely similar, and the behaviors to be displayed should be identical or at least extremely similar. When these conditions exist, the training is said to have high fidelity with the job to which it is to transfer.

Laboratory research settings can also be viewed in terms of their fidelity with field settings. Often laboratory researchers attempt to obtain such fidelity. Perhaps the greatest success creating laboratory settings which were very similar to field conditions occurred in human factors research with aircraft design for pilots. Highly elaborate simulators were constructed that matched in most every respect the conditions that pilots would face in aircraft cockpits. Experimentally controlled



manipulations of particular variables could then be examined to see the effects that manipulations would have on behavior (Thorpe, Varney, MacFadden, LeMaster, & Short, 1978).

The high fidelity training analogy breaks down somewhat with respect to actors. In training, the actors are the same in both settings; in research rarely are the subjects in the laboratory research the same as those to which the research findings are to be applied. In fact, one of the greatest criticisms of laboratory research by organizational psychologists is that the research is frequently conducted on college sophomores and then generalized to adult members of the workforce. In attempts to answer critics, some laboratory researchers have used business school students instead of those enrolled in psychology classes arguing that they are likely to be more similar to the population of persons to whom the research is to generalize. In rare cases, such cosmetic changes may help; in most they are not very convincing. A more reasonable approach to the selection of actors is to carefully consider the possible ramifications of research subjects that are or are not similar to the population to which the research is to generalize. If actor similarity is important then simply using business school students instead of psychology majors is unlikely to matter. If it is unimportant, either group will do.

How similar is similar? An answer to this question within each of the three domains--actors, behaviors, and contexts--would be extremely useful to laboratory researchers. Unfortunately, few general answers exist. The result in the training area is to go to elaborate ends to create simulated conditions that match



those in the natural setting. This often requires large financial outlays simply because of an absence of adequate guidelines as to the trade-offs between, for example, reducing similarity of conditions and maintaining the desired similarity of learned behaviors.

For laboratory research, several general perspectives have been offered for dealing with the fidelity problem. Berkowitz and Donnerstein (1982) argue that the critical issue is whether or not the subject in the laboratory setting attributes the same meaning to the variables of interest as would have occurred in a field setting. This meaning may or may not be obtained the same way in the laboratory as in the field. So, for example, if one wants to study the effects of role overload on performance, subjects in the laboratory could be assigned multiple tasks that have little or nothing in common with tasks that would be experienced on the job as long as the laboratory subjects perceived the multiple tasks as demanding the accomplishment of many more things than time allowed. This assumes that the perception of multiple task demands all of which cannot easily be accomplished accompanied by strong motivation to accomplish all of the tasks is part of role overload in any setting. Locke (1985), in the introductory chapter of this book, advocates the identification of the essential conditions in laboratory settings to allow for transfer to the field. Although he provides few general essential conditions across all research, he advocates being guided by theoretical views about the phenomena under investigation and the generation of empirical research on the essential features of laboratory research for generalization.



Fromkin and Streufert (1976) offer the most explicit framework for addressing the fidelity problem. They suggest consideration of the extent to which variables in the laboratory disrupt, compete with, or enhance each of the critical variables of interest in the field. Thus, one would consider the major actor, behavior, and context variables for a particular problem of interest then ask the extent to which it is likely that the laboratory conditions will disrupt, compete with, or enhance the behaviors of interest in the field. Although there are presently no standards for such considerations, a knowledge of the theoretical constructs of interest and the empirical relationships desired should guide an analysis of laboratory research conditions. It is an empirical question as to the extent to which high fidelity on particular variables can be modified and still maintain good generalizability to field settings. Furthermore, the empirical question can only be answered once specific settings and issues are known.

#### Replication of the Laboratory in the Field

The preceding section assumed that the researcher's goal was to understand the important parameters of field settings in order to construct conditions in the laboratory that were as similar as possible to the important features of field settings. In some cases, the reverse is desirable; the goal may be to construct field settings that are as similar as possible to laboratory conditions. Engineering units supporting manufacturing operations frequently attempt to match the field to the laboratory. New equipment is designed and first tested as a



prototype of the manufacturing process that eventually will be constructed using the new equipment. In this case, the laboratory setting is designed to be feasible in the field but not to match present field conditions.

Although designing laboratory research settings in order that they be replicated in the field is less common in behavioral research, it has been used. An example of its use is research on teaching machines. Laboratory research first controlled variables important for learning using programmed instruction (Nash, Muczyk, & Vettori, 1971). The stimuli presented to the participants were controlled in such a way as to learn about the impact of variables under study on the behavior of the participants in the research, but, in addition, the methods of control were designed to be implementable in field settings in ways similar to the laboratory assuming that the hypotheses being tested were supported. When the research was supported, learning centers were constructed to match the conditions of the laboratory as closely as possible.

Future research on the human interface with industrial robots and office information systems might do well to use laboratory research in the manner just described. Conditions set up and tested as prototypes of production work spaces, shop floor control or offices could be used to develop conditions that, in the laboratory, produce desired patterns of behavior. The laboratory conditions that proved successful could then be replicated in the field.



### Field Constraints

For many reasons, it may be impractical to do research in field settings. At the same time, it may be very desirable to learn more about some particular issue. Under such conditions, laboratory settings often provide excellent substitutes for research in the field while still producing results that generalize to those field settings where it was impractical or impossible to do the research. Some conditions that are likely to make the laboratory an attractive substitute research setting are mentioned below.

Time Constraints. Laboratory research allows for time compression; events that may be spread out over long periods of time can be studied in the laboratory in much less time. Behavioral decision-making research is an example of time compression. Models of decision making are frequently applied to situations where individuals have at their disposal a finite number of cues (sets of information) which they use to make some judgment (Einhorn & Hogarth, 1981). For example, an interviewer may look at four or five characteristics of each applicant for a job and then make a decision about whether or not to hire the person. Or a medical doctor may assess a patient's temperature, pulse, blood-pressure, skin color, and breathing rate, then reach a decision about the presence or absence of some disease based upon an assessment of these symptoms. To wait for the interviewer to review enough applicants or the doctor enough patients to discover how interviewers, doctors, and people in general weight and combine cues to make decisions could take weeks, months or years. On the other hand, in the laboratory,



presenting interviewers, medical doctors and others with large numbers of cases in a short period of time can lead to useful information about how these groups of people make decisions. Decision making models can be constructed from the laboratory data and these models then tested in the field. Although the development of decision making models in the laboratory does not guarantee that similar decisions will be made in the same way in the field, models developed from the laboratory can be tested in the field to judge their generalizability. The total amount of time needed for the laboratory research and its validation in the field almost always is much less than if all the research were conducted in the field.

Cost. Good field research is expensive--often prohibitively so. Good laboratory research can also be expensive. However, the issue is relative rather than absolute cost. If the problem of concern is one that appears adaptable to investigation in the laboratory, it is usually less expensive to conduct the research in a laboratory setting than in the field. The choice of setting raises a utility question: Considering all investments in the research in each setting and the probable information yield, which of the two settings has the higher utility? The answer to this question may lead to a preference for laboratory research over field in many instances. Yet, it should always be kept in mind that the cost should only be considered along with potential yield in information; it is never reasonable to choose one setting over another if the loss in potentially valuable information drops below a level acceptable to the researcher.



Ethical constraints. There may be times when important research questions cannot be addressed in field settings because of ethical reasons. In the laboratory, the ethical issues may be resolved. As a case in point, I was once involved in a research project that addressed the effects of reward systems and the structure of tasks on work motivation. To study work motivation, we felt we needed to present some very different levels of various incentives which were likely to create large differences in the amount of pay people received on the same job. We also felt that the behavior of employees at their work stations needed to be filmed so that we could measure more precisely the actual behaviors of the people over time. It was our conclusion that these restrictions would create inequities among employees on a regular job and would invade their privacy; in sum, we felt that the manipulations necessary to learn what we wanted to learn violated the implicit contract that the employees had with the firm when they were hired and thus should not be conducted with full-time employees on regular jobs. Our solution was to hire people to work on a part-time job that lasted from two weeks to a month and to explain to all applicants that part of our concern was to try out some different work practices and that, to evaluate them, a camera would record their work. Knowing this before accepting the job allowed the applicants to choose whether or not they wanted to accept employment under these conditions and removed our ethical concerns about the research.

Threats to Health and Safety. On jobs involving physical work with hand tools and other forms of equipment, the temperature of the workplace affects performance and the number



of accidents that occur (McCormick & Ilgen, 1985). As might be expected there are optimal temperature ranges above which and below which performance decreases and the number of accidents increases. Obviously, when designing work spaces or deciding whether iron workers should continue to work on building a skyscraper under particular weather conditions, it is extremely important to know the effects of temperature on work behaviors. However, to conduct research in the field when conditions are such that the researcher suspects the health and safety of workers is at stake simply to gather data about conditions that may lead to accidents is hardly acceptable. Laboratory data may be particularly useful for investigating such relationships. Under conditions in the laboratory that did not threaten the health and safety of participants in the research, behavioral decrements could be observed which, in the field, might increase the probability of an accident.

Research Not Possible in the Field. The final constraint to be discussed is the case in which the variable or variables cannot be investigated directly in the field. Recent concerns for the accuracy of performance appraisal ratings provide an example of this condition. In field settings, there rarely is any direct measure of rater accuracy. From knowledge about the nature of common rater errors some inferences can be made about accuracy, but recent research has shown that even the presence of the commonly accepted rating error, halo, may not be related to accuracy (Bernardin & Pence, 1980). Thus, although rater accuracy remains an extremely important concern when performance appraisals are used in organizations, accuracy can



rarely, if ever, be assessed directly in the field. On the other hand, laboratory conditions can be constructed that establish performance conditions against which ratings can be compared and accuracy assessed.

When the measurement of variables important in natural settings is possible in the laboratory but not in the field, generalization from the former setting to the latter is less direct than in most of the cases discussed so far. In particular, it is not possible to replicate laboratory research in the field because of the primary variable of interest cannot be measured in the field. As a result, the evaluation of generalization must be indirect. In the case of performance accuracy, when variables affecting accuracy in the laboratory are introduced in the field, the effects of these variables on observable consequences expected to covary with accuracy can be assessed, and inferences about their effects on accuracy can be made. For example, if laboratory research demonstrates that observational frequency impacts on rating accuracy, then observing that changes in field conditions affect observation frequency in ways similar to those observed in the laboratory, implies that accuracy may also have been affected by the changes even though it was not possible to measure accuracy in the field.

#### The "Can It Happen?" Hypothesis.

There are times when the research question of interest deals with the need to demonstrate that some event, condition, or process can occur in contrast to demonstrating that it does occur in the settings to which generalization is of interest.



Laboratory research is particularly well suited for testing hypotheses of this nature because the demands for generalization are less stringent; it is not necessary to show that the effect does occur with a specified frequency in the field but only that it is possible for such an effect to occur there (Mook, 1983). Berkowitz and Donnerstein (1982) used television violence as an example of this condition. They pointed out that laboratory research showing that children respond to contrived stimuli more aggressively after watching television with high violence as compared to low violence lacks ecological validity for generalizing to teenage crime. But, on the other hand, it is good to know whether or not films presented on television can influence aggressive behavior.

Within the domain of organizational behavior, initial tests of the social influence hypothesis with respect to job satisfaction fit the "Can it happen?" model. Salancik and Pfeffer (1977) questioned the adequacy of need discrepancy theories for explaining the source of job satisfaction. They suggested that employees may derive their views about satisfaction with their jobs, in part, from listening to how others on the same job felt about the job. According to the social influence hypothesis, if the others were quite satisfied with their jobs, and expressed their satisfaction in a way that the target employees could observe the level of satisfaction, the target employees may decide they too were satisfied with it. This point of view became known as the social influence view of job satisfaction and was quite novel at the time it was introduced. Thus, it was of interest to discover if the



satisfaction of people with a particular situation could be affected by how others said they felt about that situation. Laboratory studies showed that peoples' satisfaction could indeed be influenced by what others said about their own feelings (O'Reilly & Caldwell, 1979; Weiss & Shaw, 1979; and White & Mitchell, 1979). The laboratory research was very useful even though no one would have required that the laboratory research generalize directly to the field. The research simply demonstrated that, peoples' attitudes could be influenced by their beliefs about the attitudes of people around them about the same attitude object. Knowing this was possible allowed for further exploration of the possible ramifications of such effects in natural settings.

A second example is Lowen and Craig's (1969) study of leader behaviors. Field research on leader behaviors had tended to imply that causal links went from leader behavior to group performance; that is, the behavior of the leader caused certain levels of group performance. Lowen and Craig suggested that the causal direction of leader behavior and group performance may have been the reverse--group performance on a particular level caused leaders to behave in certain ways. Their laboratory research demonstrated that the causal direction could be reversed. The knowledge of this fact was very useful for modifying implications made from field data about leadership behavior and group performance.

Another way to look at the purpose of laboratory research from the perspective of this section is to see it as testing generalizations rather than making them (Mook, 1983). Mook's



night vision example is a good one here. A theory of vision was developed which described specific types of receptors (rods and cones) and postulated how they worked. Knowledge about the lack of speed in adjustment to dark and the insensitivity of cones to shorter wavelengths of light led to the use of laboratory research to test generalizations about the way the eye functions in vision. Once the generalizations were known about the function of the eye, it was hardly necessary to test whether the function of the eye was the same in the field as it was in the laboratory.

Application of the knowledge is not attempting to generalize conditions from the laboratory to the field. Rather it is to use the knowledge generated in the laboratory for issues relevant to the field. Thus, the use of red lights to avoid dark adaptation problems of people working in environments which require having good night vision is an application of theory tested in the laboratory not an application of the laboratory study to the field.

### Conclusions

The laboratory is only one of a number of settings for conducting research on organizational behavior. Although I strongly disagree with the tendency among organizational behaviorists to underestimate the potential contributions of laboratory research to understanding behavior in organizations, it cannot be denied that there are often times when the laboratory setting is inappropriate. I would further agree that the relative ease of access to laboratory research settings in



comparison to field ones tends to increase the frequency with which laboratory research is conducted and often the frequency of its inappropriate use. In spite of these reservations, when the researcher considers carefully the advantages and disadvantages of all types of settings in which to conduct research on a particular problem, often the conclusion is that laboratory research can be very valuable. If one or more of the conditions described in this chapter are present, more than likely, laboratory research is appropriate for studying behavior relevant in organizational settings. In fact, under such conditions the laboratory may not only be an acceptable setting; it may be the preferred one.



## Footnotes

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<sup>1</sup>

Carlsmith, Ellsworth, & Aronson (1976) labeled this condition as "mundane realism" in which the researcher tries to match the laboratory conditions to the field. He contrasted this type of realism with "experimental realism" where the focus is on creating experimental conditions which capture the theoretical nature of the construct.



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